The Solar Dynamics Observatory, studying the Sun and its influence on other bodies in the solar system.

The solar photon output, which was once thought to be constant, varies over all time scales from seconds during solar flares to years due to the solar cycle. These solar variations cause significant deviations in the Earth and space environments on similar time scales, such as affecting the atmospheric densities and composition of particular atoms, molecules, and ions in the atmospheres of the Earth and other planets. Presented and discussed will be examples of unprecedented observations from NASA's new solar observatory, the Solar Dynamics Observatory (SDO). Using three specialized instruments, SDO measures the origins of solar activity from inside the Sun, though its atmosphere, then accurately measuring the Sun's radiative output in X-ray and EUV wavelengths (0.1-121 nm). Along with the visually appealing observations will be discussions of what these measurements can tell us about how the plasma motions in all layers of the Sun modifies and strengthens the weak solar dipole magnetic field to drive large energy releases in solar eruptions. Also presented will be examples of how the release of the Sun's energy, in the form of photons and high energy particles, physically influence other bodies in the solar system such as Earth, Mars, and the Moon, and how these changes drive changes in the technology that we are becoming dependent upon. The presentation will continuously emphasize how SDO, the first satellite in NASA's Living with a Star program, improving our understanding of the variable Sun and its Heliospheric influence.

The Solar Dynamics Observatory, NASA's High Definition View of our Explosive Sun.

The Sun was once thought to be a very stable source of energy to the Earth. In fact, scientists even referred to the light output from the Sun as the 'solar constant'. Over 400 years ago, Galileo Galilei was one of the first to observe that the surface of the Sun actually had dark sunspots that would appear and disappear, one of the first signs that the Sun may not be so constant after all. Over the many years since then, generations of solar scientists have studied the Sun and finding is has very large variations on all time scales from seconds to years. Large eruptions from the Sun were also found and studied in detail, as well as connection made to how these eruptions can affect us and the technology we are dependent upon here on Earth. Launched on February 14, 2010, the Solar Dynamics Observatory (SDO) is now providing an amazing new view of the Sun. New movies of the Sun, at 10 times better resolution than High Definition Television (HDTV), will be present showing how they are providing scientist amazing new views of these extreme solar eruptions. Also presented will be how these large eruptions from the Sun can affect technology on Earth, Mars, and the Moon, such as spacecraft health, GPS navigation, satellite drag, radio communication, airline flights, surveying, and also those that may race pigeons.